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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Bicycle Wheels

I, TOKUO ASANO, a Japanese citizen, of 1280, Ootobe, Niezaki-cho, Tsu-shi, Mie-ken, Japan, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an accelerating device for bicycles, auto-bicycles and the like, and more particularly to a bicycle or auto-bicycle wheel on which is mounted a weight for the acceleration thereof and also to a bicycle or auto-bicycle having such a wheel.

There have been made various proposals to accelerate bicycles, auto-bicycles and the like (hereinafter referred generally as "bicycles"). Most of these conventional proposals have been directed to changes in design or structure of the bicycle or improvements of the power transmission mechanism or engine. However, they are complicated in construction or expensive.

Therefore, it is an object of this invention to provide means for smoothly accelerating bicycles which is simple in construction and is inexpensive.

It is another object of this invention to provide an improved bicycle wheel which is simple and inexpensive and which is effective in accelerating the bicycle without any additional modification such as of driving mechanism, power transmission mechanism or engine (in the case of an auto-bicycle).

Briefly the above and other objects of the invention are accomplished by mounting a plurality of weight blocks within the well of a wheel rim, said weight blocks being arranged diametrically opposed and symmetrically in respect of the central axis of the wheel.

Other objects, features and advantages of the invention will be apparent from the following description which will be made by refer-

ring to the accompanying drawings wherein:

Fig. 1 is a schematic view of a bicycle wheel embodying the present invention;

Fig. 2 is an enlarged section taken along the line II—II of Fig. 1; and

Figs. 3 and 4 are respectively schematic views of a bicycle wheel according to the invention.

Referring to the drawings, more particularly Fig. 1, there is schematically shown a conventional bicycle or auto-bicycle wheel comprising a hub 1, spokes 2, rim 3 and tyre 4. This wheel structure may be any conventional one and therefore is not restricted to the particular type shown.

The important and essential feature of the invention is in the provision of a plurality of spaced weight blocks within the well of the rim as shown in Figs. 1 and 2. It is necessary that these weights be arranged diametrically opposed and symmetrically in respect of the central axis of the wheel as shown. Referring to Fig. 2, each weight block W and W¹ is inserted in the well 5 and may be fixed therein by any suitable manner. Thus each weight block W and W¹ may be fixed in the well 5 by applying an adhesive therebetween or each weight W and W¹ may be fixed in place by means of a screw 6 extending through the rim into the body of the weight. The axial width of each block W and W¹ should be such that there is left between the side wall of each block W and W¹ and the axially inner side wall of the rim recess a space for receiving a bead portion 7 of the tyre 4 as shown in Fig. 2. The radial height of each weight block W and W¹ should also be so selected that it will not project so much from the recess as to prevent the fitting of the inner tube 8. Usually each weight block W and W¹ is so dimensioned that it will not project radially outwardly beyond the level of the radially outermost

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portion 9 of the rim 3. It will be understood that the weight blocks may be mounted similarly on the rim of a solid or tubeless tyre wheel instead of the usual pneumatic tyre wheel as shown.

Each weight block is preferably elongated in shape but the particular shape may be varied depending upon the material (particularly specific gravity thereof) thereof, the size of the wheel, and the number of the weights to be mounted. Of course, it is preferable that the block is as small as possible provided it has a desired weight. Taking as an example a bicycle or auto-bicycle wheel of a standard diameter (i.e. 26 inches) provided with two weights, W and W', a satisfactory result would be obtained if each of the weights is about 100—150 grams. In this case the weight block may be for example 10—15 cm. in length, 1—1.5 cm. in width and 0.9—1.1 cm. in height. Any suitable material, e.g. stone, metal, may be used as the weight block provided that a desired weight is obtained. Examples of suitable materials are zinc, tin, lead, iron, steel and an alloy of 0.1% antimony, 0.5% tin and balance zinc. It is also preferable that the blocks W and W' are substantially equal in weight.

By the attachment of these weight blocks on a wheel in accordance with this invention, both the moment of inertia and rotary moment of the wheel is increased so that the bicycle or auto-bicycle, when driven by a given force, is more smoothly accelerated and smoothly driven. This may be theoretically explained as follows:—

Referring to Figs. 3 and 4, the letter "r" indicates the outer radius of the rim 3 and the letter "d" indicates the diameter of the tyre 4. Assuming that the total mass of the wheel (without the weight blocks W and W') is m_1 and the mass of each of the weight blocks W and W' is m_2 , the mass M of the wheel fitted with the blocks would be $m_1 + 2m_2$. The moment of inertia (I), therefore, is as follows:—

$$I = (m_1 + 2m_2)r^2$$

It will be apparent from the above that, by the provision of the weight blocks W and W', the moment of inertia is increased by $2m_2r^2$.

Consequently, in accordance with Newton's First Law, the bicycle provided with this wheel requires a greater impressed external force (e.g. wind, frictional resistance) to produce a change in its velocity.

Furthermore, when two weight blocks W and W' are mounted on the wheel rim as shown the force to increase the forward rotary movement of the wheel is also increased. Assuming that the bicycle is running at a velocity of v, with the weight blocks W and W' in the positions A and C respectively indicated

in Fig. 4 there will be two rotary forces or rotary moments (about the point of contact with the ground G) produced due to the weight blocks, one being $F_1 = m_2.v.(2r+d)$ in the direction of advancement and due to the weight block W and the other being $F_2 = m_2.v.d$ in the direction opposite to advancement and due to the weight block W'. Therefore, the forward rotary moment acting on the wheel shaft is increased by the difference between F_1 and F_2 . It will be noted this rotary torque ($F_1 - F_2$) to facilitate the advancement of the wheel will increase with the increase in the velocity v. Of course, at a given speed, the difference between the components of the forces F_1 and F_2 in the direction of advancement will be a maximum when the blocks W, W' are at the positions A and C and will gradually decrease to zero, i.e. when they are at the positions B and D.

Due to the above-mentioned increase in or addition of moment of inertia and rotary moment the bicycle (or auto-bicycle) is accelerated smoothly and can be driven with a less effort (foot pedal power) or less energy. The further advantages of the device of this invention are that the weight blocks may readily be mounted on any existing bicycle wheel rim, the blocks are simple in construction and are inexpensive, that there is no increase in the external forces resisting motion of the wheel because the blocks are mounted on the rim, and that as the blocks are mounted in the well of the rim there is no difference in appearance due to the mounting of the blocks.

Although two weight blocks are mounted on the wheel rim in the embodiment shown it will be understood that two or more pairs of weight blocks may be mounted on a wheel rim if desired. It is possible to mount the weight blocks on either or both of the wheels of a bicycle or auto-bicycle.

WHAT I CLAIM IS:—

1. A wheel for a bicycle, auto-bicycle or the like comprising a rim and a plurality of weight blocks mounted within the well of the rim, said weight blocks being arranged diametrically opposed and symmetrically in respect of the central axis of the rim.

2. A wheel as claimed in claim 1, in which each weight block is so shaped and dimensioned as to permit the fitting of a tyre or tyre and inner tube.

3. A wheel for a bicycle or auto-bicycle substantially as hereinbefore described with reference to the accompanying drawings.

4. A bicycle or auto-bicycle having a wheel as claimed in any one of the preceding claims.

5. A bicycle or auto-bicycle in which both of the wheels are of the construction claimed in any one of claims 1 to 3.

STEVENS, LANGNER, PARRY &
ROLLINSON,
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Agents for the Applicant.

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1 SHEET

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